

PATENT

INKLESS FINGERPRINT COMPOSITION AND APPLICATOR THEREFOR

FIELD OF THE INVENTION

The present invention relates to a disposable applicator containing a non-staining fingerprint composition and method of making the same.

DESCRIPTION OF THE PRIOR ART

Although there are other methods of identifying individuals, it has become readily apparent that fingerprints provide a relatively simple, unique and absolute means of identification that requires little cooperation from the subject. Since fingerprints are archived they must be permanent and because they are often captured by an electronic camera, the preferred color of fingerprint images is black. Printer's ink, which contains carbon pigmentation, meets the requirements of image permanency and color and has been and is still being widely used. Generally the ink is stored in a convenient reservoir such as a tube (for application to a plate prior to the fingerprinting procedure) or in a pad (against which the person's fingerprint area is pressed before being deposited onto a paper substrate).

1           The tube and plate system, while skill intensive and  
2 time consuming to use, lends itself to large scale  
3 fingerprint operations such as police stations etc. The  
4 ink pad system, while lending itself to smaller scale  
5 fingerprint operations, has disadvantages such as the  
6 need to periodically replenish the ink and store  
7 replacement ink.

8           Disposable ink coaters, while eliminating the need  
9 to replenish ink in a pad, are generally expensive on a  
10 per use basis. For example, see my U.S. Patent no.  
11 6,027,556 ("556 patent") which describes an applicator  
12 for a nonstaining ink in which an absorbent ink pad  
13 material made of a melt-blown calendared polyester fabric  
14 is encapsulated between two gas-impermeable sheets, heat  
15 sealed along their edges. A spine is provided along one  
16 end of the applicator to allow a user to grasp the spine  
17 after the sheets are opened and rub the pad across a  
18 subject's skin such as his or her foot thereby coating  
19 that area with the nonstaining ink.

20           The lest expensive ink coaters are in the form of  
21 ink foils. The foils are comprised of two superimposed  
22 strips of polyester film with a coating of viscous ink  
23 solution disposed between the strips. The ink is  
24 composed of carbon black and lanolin. See Fig. 1 of the  
25 drawings which illustrates a carbon pigmented ink and  
26 lanolin solution 10 deposited on a thin plastic film 12  
27 and Fig. 2 which illustrates the ink sandwiched between  
28 the lower film strip 12 and an upper film strip 16. The  
29 strips, generally made of Mylar® (Mylar is a registered  
30 trademark of E.I. DuPont de Nemours & Company), are of  
31 the same length with a margin 14 at one end of each strip  
32 on which ink is not deposited during the manufacturing

1 process. The inkless margins 14 are apparently designed  
2 to allow a user to separate the two strips. After the  
3 layers 12 and 16 of film are peeled apart, one or both of  
4 the strips may be placed on a flat surface such as a  
5 table or hood of a patrol vehicle with the ink side up so  
6 that the ink may be transferred to the subject's  
7 fingerprint area in a conventional manner. The user thus  
8 has one or both surfaces from which to ink the fingers,  
9 palms, feet of a person to be fingerprinted. The  
10 tackiness of the ink keeps the strips intact until they  
11 are peeled apart by hand. The lanolin, because it has a  
12 melting point of about 107 degrees F and a softening  
13 point much less than that, is problematic because in warm  
14 environments the ink can migrate and impair the quality  
15 of the coating as well as leak out from between the  
16 strips of film. Typically, this type of carbon pigmented  
17 ink stains the skin severely and is difficult to remove  
18 because the tackiness needed to keep the coating and film  
19 intact also makes the ink adhere strongly to the skin.  
20 The typical foils can be hard to open because of the  
21 difficulty grasping the separate marginal areas 14 of the  
22 foil strips.

23 There is a need for an inexpensive fingerprint  
24 composition and disposable applicator therefore which  
25 overcomes the above problems.

#### 26 SUMMARY OF THE INVENTION

27 A non-staining or inkless fingerprint composition  
28 and disposable applicator therefore, in accordance with  
29 the present invention, includes two substantially  
30 nonpermeable foil strips having substantially the same  
31 width. The strips are superimposed one on one another  
32 with one of the strips being slightly longer than the

1 other to provide an extended free pull-tab. The shorter  
2 strip also has a free pull-tab which extends under (or  
3 over) the extended pull-tab to allow a user to grasp both  
4 pull-tabs to physically separate the strips thereby  
5 enabling the fingerprint composition on one or both of  
6 the strips to be applied to a person's fingerprint area.  
7 A thin layer of an inkless (or nonstaining) fingerprint  
8 composition is sandwiched between the superimposed foil  
9 strips leaving a small peripheral border including the  
10 area between the extended and shorter pull-tabs free of  
11 the composition.

12 An inkless composition includes a solution of a  
13 color former which is semisolid at ambient temperature.  
14 The color former is characterized by forming a  
15 perceivable colorant product representing a person's  
16 fingerprint when applied to the person's fingerprint area  
17 and deposited onto a paper substrate in the presence of  
18 a developer. The color former may comprise one of the  
19 transition metal salts and the solvent may include  
20 glycol, glycol fatty acid esters, fatty acids,  
21 polyoxyethylene fatty esters or other reagents which are  
22 compatible with the color former and are sufficiently  
23 heat resistant to maintain the composition in a semisolid  
24 state at room temperature, e.g., about 100°F or less. It  
25 is to be noted that the developer may be separate from  
26 the color former solution or an integral constituent  
27 thereof with a sufficient amount of chelating agent to  
28 inhibit reaction between the color former and developer  
29 until the composition is applied to the fingerprint area  
30 and deposited onto the paper substrate.  
31  
32

1 With respect to the method of making the disposable  
2 applicator with the inkless composition therein, I  
3 provide two substantially nonpermeable thin film strips  
4 of plastic foil approximately the same width with one  
5 strip being slightly longer than the other. For example,  
6 the strips may be cut from a suitable stock material such  
7 as Mylar having a thickness of .001" - .005" and  
8 preferably within the range of .002" to .003". I also  
9 provide an inkless fingerprint composition with the  
10 constituents discussed above. The composition is heated  
11 to liquify the semisolid composition and then coated on  
12 one (or both) of the strips leaving a peripheral margin,  
13 including the area under the pull-tabs free of the  
14 composition. The strips are then superimposed on one  
15 another with the inkless composition sandwiched  
16 therebetween and left to cool to room temperature.

17 The invention may be best understood in reference to  
18 the following description taken in conjunction with the  
19 accompanying drawings.

#### 20 BRIEF DESCRIPTION OF THE DRAWINGS

21 Fig. 1 is a top plan view of the lower foil strip of  
22 a disposable prior art fingerprint ink coater with ink  
23 coated thereon;

24 Fig. 2 is a side view of the lower strip of Fig. 1  
25 and a top strip superimposed thereon with the ink  
26 sandwiched between the strips;

27 Fig. 3 is a top plan view of a lower foil strip of  
28 a disposable coater with a layer of inkless fingerprint  
29 composition placed thereon in accordance with the present  
30 invention;

31 Fig. 4 is a bottom plan view of an upper strip to be  
32 overlayed on the lower strip of Fig. 3 without any

1 inkless composition thereon;

2 Fig. 5 is a side view of the superimposed strips of  
3 Figs. 3 and 4 with the inkless composition sandwiched  
4 therebetween; and

5 Fig. 6 is a diagrammatic perspective view of a  
6 simplified apparatus for making the disposable inkless  
7 fingerprint application of the present invention.

8 DESCRIPTION OF THE PREFERRED EMBODIMENT

9 Referring now to the drawings and particularly to  
10 Figs. 3, 4, and 5 the preferred embodiment of the present  
11 invention includes a pair of substantially nonpermeable  
12 plastic foil strips 20 and 22 made, for example, from  
13 Mylar with a layer or coating of a nonstaining or inkless  
14 fingerprint composition 24 sandwiched therebetween. As  
15 is illustrated the strips are of the same width with the  
16 bottom strip being slight longer, e.g., 1/4 inches, to  
17 form an extended free pull-tab 26 which extends beyond  
18 the upper strip 22 in the assembled condition. The  
19 upper strip also includes a shorter pull-tab 28 so that  
20 in the assembled condition a user can grasp both pull-  
21 tabs and by applying opposite forces to the tabs separate  
22 the two strips. A coating or layer of an inkless  
23 fingerprint composition is applied to one or both strips  
24 before assembly leaving uncoated only a peripheral border  
25 30 of say about 1/16" in width and the area between the  
26 pull-tabs 26 and 28.

27 The inkless fingerprint composition includes a color  
28 former which may be one or more of the transition metal  
29 salts selected from the groups 5A-8A, 1B-5B and 7B of the  
30 periodic Table of Elements. More specifically while  
31 salts of iron, e.g., ferric chloride, have also been  
32 found to be very satisfactory, salts of titanium,

1 vanadium, chromium, magnesium, cobalt, nickel, copper,  
2 zirconium, zinc, niobium, molybdenum, silver, tantalum  
3 and tungsten have been found satisfactory.

4 A suitable solvent for the color may comprise one or  
5 more reagents from the following group: glycol, glycol  
6 fatty acid esters, fatty acids, and fatty alcohols and  
7 more specifically one or more of the following: glyceryl  
8 lanolate, glyceryl laurate, glyceryl myristate, glyceryl  
9 oleate/palmitate/ricinoleate, polyethylene glycol castor  
10 oils/cocoates/isostearates, polyethylene glycol  
11 lanolates, stearyl alcohol, myristyl alcohol, cetyl  
12 palmitate, cetyl alcohol and bees wax (a blend of fatty  
13 acid esters).

14 The solvent must be compatible with the color former  
15 and sufficiently heat resistive to maintain the  
16 composition in a semisolid state at room temperature,  
17 e.g., about 100° or less and in a liquid phase at about  
18 110°F to 150°F and preferably within a temperature range  
19 of 115°F to 130°F.

20 The color former is characterized by forming a  
21 perceivable colorant product, e.g., black in color,  
22 representing a person's fingerprint when applied to the  
23 person's finger (or other parts of the body) and  
24 deposited onto a paper substrate in the presence of a  
25 developer. It is to be noted that when used herein the  
26 term fingerprint and fingerprint area includes a person's  
27 finger, palms, foot or other portion of the body, the  
28 print of which is unique to the individual.

29 The developer may be separate from the color former  
30 composition or an integral constituent thereof with a  
31 sufficient amount of chelating agent to inhibit the  
32 reaction between the color former and developer until the

1 composition is applied to the fingerprint area and  
2 deposited onto a paper substrate. See my pending  
3 application serial no. 09/853,452 filed May 10, 2001,  
4 entitled Inkless Fingerprint Compound and Method, which  
5 application is incorporated herein by reference.

6 Alternatively, the developer may be included in the  
7 paper substrate as described in my U.S. Patent No.  
8 4,983,415 which patent is also incorporated herein by  
9 reference.

10 A third alternative for combining the color former  
11 with a developer at the time the fingerprint is to be  
12 taken is described in U.S. Patent No. 4,182,261.

13 The developer, whether incorporated into the inkless  
14 composition or separately available as a coating on the  
15 paper substrate or in a separate reservoir to which the  
16 finger with the inkless composition thereon is to be  
17 subjected prior to the deposition of the print onto the  
18 paper substrate may be selected from one or more of the  
19 group of:

20 2,4,6 - Trihydroxy Benzoic Acid

21 3,4,5 - Trihydroxy Benzoic Acid

22 Dimethyl Glyoxime

23 Rubeanic Acid

24 Potassium Ferrocyanide

25 Sodium Ferrocyanide

26 Pyrogallol

27 Hydroxyquinoline and its derivatives e.g.,

28 quinolinol sulfate

29 Pyrocatechol

30 Propyl Gallate

31 Resorcinol

32  $\beta$ -Resorcylic Acid



1 Tiron (4,5 - Dihydroxy-m-Benzene Disulfonic  
2 acid Disodium Salt)  
3 Gentisic Acid  
4 Procatechuic Acid  
5 Phloroglucinol  
6 Tannic Acid  
7 Sodium Tetrathionate  
8 Sodium Thiosulfate  
9 Diethyldithiocarbamic Acid  
10 2-pyrrolidinecarbodithioic Acid

11 A nonstaining ink which may be used in my invention  
12 is described in the '556 patent discussed earlier. The  
13 '556 patent is incorporated herein by reference. The  
14 nonstaining ink is formulated by dissolving one or more  
15 alcohol soluble dyes in one or more fatty acid esters  
16 which have at least one available hydroxyl group as  
17 described in detail in the '556 patent. It should be  
18 noted that the formulations described in that patent  
19 would need to be slightly modified to be in a semisolid  
20 state at ambient temperature by increasing the viscosity  
21 of the solvent. The dye preferably is a metal complexed  
22 dye, e.g., complexed with a polyvalent transition metal  
23 such as iron, chromium, copper or zinc. Three of the  
24 fatty acids may be glyceryl mononunoleate.

25 The following are several formulations of an inkless  
26 fingerprint composition (without developer) suitable for  
27 the present invention:

28 Example 1: combine polyoxyl 40 stearate (aka  
29 polyethylene glycol 400 stearate), ferric chloride  
30 hexahydrate, 2-phenoxyethanol (aka Dowanol EPH) as  
31 follows: 1000 grams PEG 400 stearate, 300 grams ferric  
32 chloride hexahydrate, and 100 grams 2-phenoxyethanol.

1 Polyoxyl 40 stearate has a congealing temperature of  
2 37 to 47 degrees C.

3 Example 2: 1000 grams PEG 400 stearate, 300 grams  
4 ferric chloride hexahydrate, and 100 grams propylene  
5 glycol

6 Example 3: 1000 grams Lanolin, 300 grams ferric  
7 chloride hexahydrate, and 100 grams 2-phenoxyethanol.

8 It should be noted that the melting problem  
9 associated with a combination of lanolin and carbon based  
10 ink as used on the prior art foils is overcome in Example  
11 3 formulation by the high solid concentration of ferric  
12 chloride hexahydrate. Also carbon based ink readily  
13 absorbs infrared energy thereby augmenting the problem of  
14 the lanolin melting. Ferric chloride hexahydrate does  
15 not have this problem.

16 A suitable formulation of an inkless fingerprint  
17 composition with a developer incorporated therein is as  
18 follows:

19 Polyethylene glycol 200 monolaurate - 100 ml

20 Propylene glycol - 300 ml

21 Polyethylene glycol 400 monostearate - 700 g

22 Ferric chloride hexahydrate - 90g

23 Citric acid, anhydrous - 65g

24 8 - Quinolinol - 130g

25 Example 4: a nonstaining fingerprint composition for  
26 use in my invention may comprise: 850 grams PEG 400  
27 monostearate, 150 grams of solvent, e.g., propylene  
28 glycol or 2-phenoxyethanol, solvent or oil soluble dye,  
29 e.g., 20 grams of nigrosine.

30 It should be noted that the above formulations are  
31 by way of examples only and are not to be considered as  
32 limiting the scope of the invention.

1           A method of manufacturing the disposable foil  
2 applicator with the inkless or nonstaining fingerprint  
3 composition contained therein is illustrated in Fig. 6.

4           The chosen composition 31 is dispensed into a tank  
5 or well 32 from a reservoir 34 via a dispensing nozzle  
6 36. Heat from a suitable source such as an electric  
7 heater coil 38 heats the well 32 to maintain the inkless  
8 composition 31 in a liquid phase, i.e., at 110°F or more.  
9 An offset roller 40 transfers the liquid composition to  
10 a printing roller 42 which has defined segregated  
11 rectangular areas 42a on the surface thereof which accept  
12 the composition and transfer it to a thin plastic sheet  
13 or film 44. The film may be Mylar having a thickness,  
14 for example, of about .001 - .005 inches and preferably  
15 about .002 inches. The film 44 is moved from a storage  
16 roll (not shown) under the printing roller 42 via a  
17 roller 46 and into contact with the composition on the  
18 surface areas 42a.

19           A second sheet of foil material 48, e.g., 2 mil  
20 Mylar, from a storage roll (not shown) is pressed over  
21 the top of the lower sheet 44 as the two sheets travel  
22 between rollers 50 and 52 to sandwich the inkless  
23 composition 31 in the form of separated rectangular  
24 layers between the two sheets as illustrated. A rotating  
25 cutter 54 in conjunction with a lower roller 56 cuts the  
26 sheets into individual rectangular sections each section  
27 58 containing the inkless composition between the upper  
28 and lower foil strips. The superimposed strips 58 may  
29 then be cooled to room temperature, trimmed, if  
30 necessary, and packaged for subsequent shipment.

31           It should be noted that one of the sheets 44 or 48  
32 is preferably made wider than the other to provide the

1 staggard pull-tabs 26 and 28.

2 In use it is only necessary to separate the foil  
3 strips 20 and 22 by grasping the pull-tabs 26 and 28.  
4 One or both of the separated strips may then be used to  
5 apply the inkless composition thereon to the desired  
6 portion of the body to be fingerprinted, i.e., fingertip,  
7 palm, feet, etc.

8 There has thus been described a novel disposable  
9 applicator and inkless or nonstaining fingerprint  
10 composition which is inexpensive to manufacture, suitable  
11 for storage in relatively warm environments and easy to  
12 use without staining the fingers or other parts of the  
13 person being fingerprinted. Modifications of the  
14 preferred embodiment may be made without departing from  
15 the spirit and scope of my invention as defined in the  
16 appended claims.